

# *Getting Around Puget Sound*

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Washington State  
Department of Transportation's  
Integrated  
Highway System

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## Introduction

There is no doubt about it. People who live in the Pacific Northwest are fortunate.



On a clear day, commuters in King, Pierce and Snohomish counties are greeted with breathtaking views—shimmering water on lakes, snow-topped peaks outlining the Olympic and Cascade mountains, and nearby islands

creating curves in the vast Puget Sound.

Of course we're not alone. For better or worse, 2.56 million other people have also chosen to make this natural wonderland their home. But all 2.56 million of us know all too well that living here has a price—**traffic is a mess!**



And—we know something else. Traffic congestion isn't likely to get much better. Traffic engineers do not expect current public funding levels to meet transportation demands. Predictions of urban growth add another 1.24 million people to the three-county area over the next 25 years. That's almost **three times** the number of people now living in the city of Portland, Oregon!

So, you wonder, how on earth are we going to manage? Traffic's already bad enough!

The time has come for creative, innovative thinking. Individual citizens, private businesses and government agencies are already working hard to find and fund solutions to our transportation crisis.

At the Washington State Department of Transportation, we know we will never have money, resources or land to build enough highway lanes to eliminate congestion. But what we have done—and will continue to do—is make existing highways “smart,” allowing us to use them to their full potential. In turn, we can pass the same tools on to you to help you make informed transportation decisions.

“*Smart highways?*” you ask.

Yes, indeed. Over the last 10 years we have been installing state-of-the-art electronic equipment into our highways to create a sophisticated, integrated highway system. The tools we use to manage highways are now available to you in your home, office, and even your car, to help you decide which way to travel **BEFORE** you get onto the road.



*Some photos and graphics in this brochure are provided courtesy of Softkey International, Incorporated.*

**Let's explore steps you can take to improve your ability to get around Puget Sound easily and quickly.**

## COMMUTER INFORMATION LINE



Real-time traffic information is just a phone call away. By dialing DOT-HIWY (368-4499), you can access WSDOT's 24-hour recorded phone system that provides information on Seattle-area traffic conditions, construction

activities, city and county road information, and Metro's rideshare program. Outside the Seattle area, you can call the line toll free at 1-800-695-ROAD. During commute hours, the traffic conditions recording is updated at least every 10 minutes—more often if conditions change.

## RADIO



Most local radio stations around Seattle provide regular traffic updates during morning and evening commute hours. Traffic reporters work hard to bring immediate and accurate information to

you, compiling it from sources such as the Washington State Patrol, WSDOT, and in some cases, their own pilots flying over the area. All major radio stations around Seattle are linked electronically to WSDOT's flow map, which graphically shows real-time traffic congestion (see *FLOW MAP*, page 5).

## FLOW MAP



The flow map is a graphical representation of real-time traffic flow around greater Seattle. It uses electronic hardware ("loops") embedded every half mile in major highways around greater

Seattle, and more frequently near freeway ramps and tunnels (see *RAMP METERS*, page 10). Our computers take data from the loops to calculate traffic flow. Using these data, the flow maps are updated every two minutes, 24 hours a day, seven days a week, and viewers can choose whether the maps illustrate traffic speeds, congestion levels or traffic volumes.

The flow map is available on WSDOT's Internet Home Page (see *INTERNET*, page 6), and is also available at transportation kiosks in area malls and businesses.

## TELEVISION



Local television stations can also be a good source of information about traffic conditions. Especially useful are the various morning newscasts, which report on traffic every 10-15 minutes between 5

a.m. and 9 a.m. on weekdays. Several area stations use live traffic video provided by WSDOT's closed-circuit television cameras to illustrate their broadcasts (see *CCTVs*, page 12).

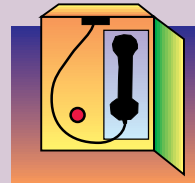
## INTERNET



If you have access to the Internet, check out WSDOT's Home Page. It provides a wealth of information about roadway construction projects, bicycle routes, ferry schedules, rail service, and other transportation-related subjects. By far, the most popular feature on our Home Page is the flow map (*see FLOW MAP, page 5*), that shows real-time traffic conditions and receives up to 11,000 Internet "hits" each week. Use the World Wide Web Uniform Resource Locator (URL) "<http://www.wsdot.wa.gov>" to access the map and Home Page.

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*Did you know  
that for every  
minute a  
freeway lane  
is blocked,  
five minutes of  
congestion  
result?*  
.....

## MOTORIST AID CALL BOXES



If you break down along the highway, you may be near one of the 173 motorist aid call boxes that WSDOT has installed for emergency use. Most of the boxes, 163 of them, are located along the Interstate 90 and State Route 520 floating bridges. The phones dial directly and exclusively to Washington State Patrol 9-1-1 operators.

The remaining 10 call boxes have been installed near freeway exit ramps that do not have public telephones nearby. On I-90, six call boxes are located at exit ramps between Bellevue and North Bend. Four more call boxes are located at exit ramps off Interstate 405 between Renton and Bothell. All locations are noted on the freeways with blue motorist information signs.

The Washington State Patrol reports that on average, their 9-1-1 operators receive two calls a day from these telephones.

Now let's talk about what we at WSDOT can do to better manage traffic, using a creative mix of people and technology. To understand how we operate, allow us to introduce you to our Traffic Systems Management Center.

## Traffic Systems Management Center

Located in WSDOT's Northwest Region office in Shoreline, TSMC is a room full of computers, television monitors and radio



dispatch equipment. This room is the heartbeat of freeway operations, run by a staff of dedicated

operators who keep abreast of what drivers are doing, what our field staff are doing, and how the entire freeway system is functioning.

No doubt you are already aware of some of the components TSMC personnel control—like variable-message signs, highway-advisory radio signs, and ramp meters. These components are purposefully designed to be visible because their function is to relay information directly to drivers.

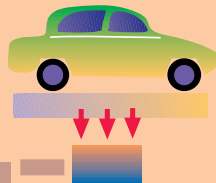
TSMC staff also control and monitor other, less visible components like closed-circuit television cameras (CCTVs), data accumulators, radio transmitters, loop detectors, and hundreds of miles of fiber-optic cable to help them keep track of what's happening on the roads. We will explain each of the components in more detail on the following pages.

Tours of TSMC are available and can be arranged by calling (206) 440-4790.

## LOOP DETECTORS

Loop detectors are the building blocks for WSDOT's highway system.

They are electronic counting devices embedded in the road that use a magnetic field to sense when a vehicle passes over them. Around greater Seattle, they are found every 1/2 mile on major highways.



On and near ramps, and through the I-90 tunnels, they are installed at more frequent intervals.

Information gathered from these loops can be used in a number of ways. They provide basic data to determine traffic volumes and levels of congestion. Some strategically located loops have additional sensors that can determine the *size* of vehicles driving on the lane. These are especially useful data, because they give traffic engineers not only traffic volumes, but also a breakdown of different *types* of traffic (e.g., trucks vs. cars).

## DATA COLLECTORS

Each loop detector is connected to a data collector. Data collectors are housed in roadside cabinets and contain solid-state electronic data accumulators. They transmit data every 20 seconds through fiber-optic cables to central computers at TSMC.

The computers then transfer the data to our flow maps (*see FLOW MAP, page 5*).





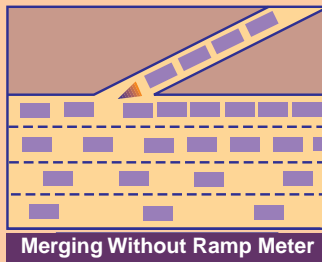
## RAMP METERS

Using ramp meters is one of the most cost-effective ways WSDOT has for efficiently operating freeways.

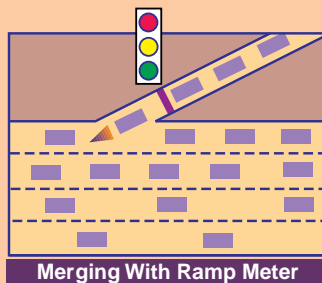
Ramp meters look like traffic signals and are placed at freeway entrance ramps. Unlike signals, however, they usually allow only one car to proceed with each green light (exceptions are signed). Their purpose is to control the *rate* at which cars enter the freeway, usually operating on 4- to 15-second cycles.

To understand how ramp meters work, think about what happens when you merge onto an already crowded freeway. Without ramp meters, many cars can merge at once. Drivers on the freeway slow down to let the cars enter, and these

slower speeds quickly cause backups. If, however, cars enter the freeway in a spaced, controlled manner, they merge easier with less disruption to mainline traffic. A short wait on the ramp allows drivers to increase their average freeway speed and shorten freeway travel times.



Merging Without Ramp Meter



Merging With Ramp Meter

Traffic engineers have found that not only do ramp meters help control mainline freeway traffic flow, but they also reduce the potential for accidents, maximizing freeway use.

### Things to know about ramp meters:

- On average, drivers wait less than two minutes at ramp meters during peak hours.
- Ramp meters are a proven and cost-effective method of relieving traffic congestion. By increasing the efficiency of freeway use, ramp meters save taxpayers costs associated with building new lanes.
- Ramp meters are programmed to respond to actual freeway conditions.
- Using data from loop detectors, TSMC's central computers automatically calculate freeway and ramp congestion, and adjust the meters accordingly. At any time, TSMC staff may override the computers and manually operate the ramp meters if they see the need to.



## CLOSED-CIRCUIT TELEVISION CAMERAS (CCTVs)



As good as the flow maps are, they do not show individual cars traveling along the highways. That's where closed-circuit television cameras (CCTVs) help. WSDOT watches traffic through many solid-state CCTVs mounted high along I-5, SR 520, I-405 and I-90.

Our TSMC staff monitor traffic every day of the week, continually looking for freeway accidents or other incidents. When a problem arises, they can immediately report it to emergency response personnel, area media and our radio dispatch units.

Several local television stations are also connected to our CCTV system so they can use our real-time traffic video to enhance their traffic reports.

CCTV cameras now cover most of I-5, I-90 and SR 520 around greater Seattle, and more are being added with each major construction project. Soon most of I-405 and SR 167 will have CCTV coverage (see *PLANNED EXPANSION*, page 18).

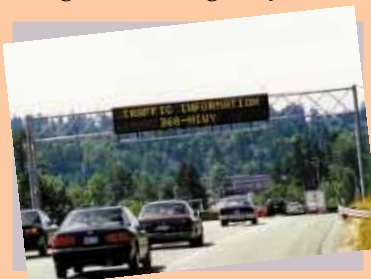
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***Did you know  
that since 1970,  
we have in-  
creased our  
driving miles  
by 280%, yet  
accidents have  
decreased by  
46%  
and fatalities  
have decreased  
by 71%?***

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## VARIABLE-MESSAGE SIGNS (VMSs)

Statistics show the most effective way to reach the traveling public is to put messages right on the highway. In construction areas,



we routinely post information on those familiar, orange-colored construction signs. But even more effective are

our variable-message signs (VMSs), those large, illuminated signs that span the freeways. Messages displayed on VMSs can be controlled either on-site by field personnel or remotely by TSMC operators.

VMSs are used in several circumstances. They are used routinely for daily occurrences, such as directing people into the I-5 Express Lanes and displaying our DOT-HIWY (368-4499) Commuter Information Line.

They can also be used for scheduled closures for construction and maintenance activities. When we close the Evergreen Point Bridge or have multiple lane closures on highways, for example, we use them to encourage drivers to take alternative routes.

But perhaps their most useful function is to alert drivers to unpredicted, unscheduled events. With the tap of a finger, TSMC operators can activate any number of preprogrammed messages that can instantly warn motorists of accidents, roadway delays or other unusual conditions. And with the flexibility built into these signs, TSMC operators can also tailor-make messages to fit just about any circumstance. What this means is that VMSs provide immediate, accurate traffic information to motorists about the very roads they're traveling on.

## HIGHWAY ADVISORY RADIO (HAR) SIGNS

Dotted throughout our region are seven low-powered AM radio transmitters used to broadcast highway advisory messages mainly on AM 530. (One exception is the HAR located near Monroe at US 2 and SR 522, which broadcasts on AM 1610.) These transmitters are activated when WSDOT wants to tell motorists about major accidents, significant road closures or other relevant information. Personnel from the TSMC radio dispatch unit record and monitor the messages, and activate large yellow blinking lights on the HAR signs to tell motorists when messages are being broadcast.



*Now let's look at the personnel who keep people moving.*

## TSMC RADIO DISPATCH UNIT (RADIO AND TUNNEL OPERATIONS)

Every hour of every day, TSMC's radio dispatch personnel are ready and able to deal with any roadway incident. They are the communication hub of the department, keeping in



constant touch with our region's field staff and chronologically recording each day's events.

Even after most of us go home, communication continues. In fact, after office hours our dispatchers expand their communication link from WSDOT personnel working in five counties to those working statewide. They are available around the clock to update highway advisory radio recordings, answer public inquiries, activate variable-message signs, and link our staff with Washington State Patrol officers and other jurisdictions. During emergencies they are especially valuable, becoming the eyes and ears of the department, and maintaining vital communication channels.



## INCIDENT RESPONSE TEAMS

With Seattle's traffic volumes the highest in the state, any disruption to normal traffic patterns can quickly cause major backups. To minimize that possibility, our Incident Response Teams are available at all hours to



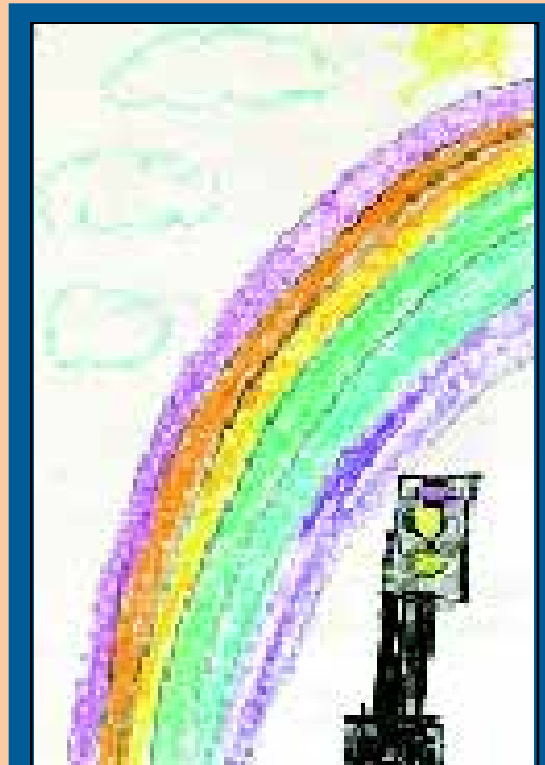
respond immediately to accidents or other incidents that require on-the-spot traffic control.

Incident Response vehicles are specially

designed to deal with a variety of problems. Their large, wooden bumpers can push disabled vehicles out of traffic lanes. Arrow boards mounted on the trucks instruct approaching motorists to change lanes. Other standard equipment includes flares, traffic cones and warning signs, fuel tank repair kits and transfer pumps, oil-containment materials, blowers to clean roadway debris, emergency floodlights and generators, and emergency communications devices.

During peak commute hours, incident response personnel monitor traffic on the east and west sides of the two I-90 floating bridges and the SR 520 Evergreen Point Bridge. By promptly removing disabled vehicles from traffic lanes, they save area commuters time, dollars and aggravation.

*Did you know  
that half of all  
vehicles that  
break down  
on the SR 520  
Evergreen  
Point Bridge  
simply have  
run out of  
gas?*



Recently, Barbara Mehlert's 3rd grade class from Highland Terrace Elementary School toured TSMC, inspiring 9-year old Amy Tenney to draw this impression of ramp meters.

To organize your own  
tour of TSMC,  
please call (206) 440-4790.



## Planned Expansion of WSDOT's Integrated Highway System

This map illustrates where our current highway system operates and where future expansion is planned. Our existing system covers the Seattle metropolitan area on Interstates 5, 405 and 90, and State Route 520. By 2000, we will extend the existing system farther east in King County, farther north in Snohomish County and farther south in Pierce County, including adding much of State Route 167. By 2010, our integrated highway system will include several new highways in all three counties. Even as you're reading this, WSDOT is constructing a second traffic center south of Tacoma, which, like Seattle's TSMC, will be designed to move traffic more efficiently in that rapidly growing area.

## What's Next?

Combine transportation and technology—and you get unlimited possibilities for improving the ways we deliver information to you. WSDOT is already working to expand highway advisory radio (HAR) operations so they broadcast not only information on construction and accidents, but also on current traffic conditions.

Similar improvements in our variable-message-sign (VMS) system are under way, with plans to install VMSs along Snoqualmie Pass to relay travel advisories to motorists and institute lower speed limits in poor driving conditions.

We are also negotiating with local cities and cable TV companies to provide information on local access television. Our goal is to offer convenient ways for you to see the flow map, live video from WSDOT's freeway cameras, and information about construction, transit and ferries.

In the not-too-distant future, even more exciting ideas will become realities. Interactive TV, in which viewers will be able to select options from their screens, will add yet another way to get information. Traffic engineers foresee TV viewers using interactive TV to choose freeway camera views, order transit or ferry tickets, or compare travel times between routes.

WSDOT is also involved in a number of projects to coordinate and improve transportation options regionwide. For example, Washington State Ferries is working with transit agencies from King, Snohomish, Kitsap and Pierce counties to create a “seamless”

regional fare collection program. This program would allow people to buy one electronic card to pay a coordinated fare for services from all these agencies.

Another very exciting one-year pilot program is about to begin that will help drivers in distress. Called PushMe (Puget Sound Regional Mayday System), the program is a cooperative effort among WSDOT, the Washington State Patrol and a number of private companies. It uses Global Positioning Survey (GPS) satellite technology to locate and respond to participating drivers in need of assistance.

Perhaps most convenient of all is a system that will provide travelers information in a form they can carry on their bodies! WSDOT is working with the Federal Highway Administration and private companies in a project called SWIFT (Seattle-Wide Information for Travelers) to create wrist watches, portable computers, and other similar devices that will receive travel information anywhere, anytime.

The Washington State Department of Transportation is actively working to make it easier for you to get around Puget Sound. In the meantime, help us help you. Consider forming a carpool or using transit. Try working alternative hours or telecommuting now and then. Coordinate errands to reduce unnecessary trips. Tune in to local media, call DOT-HIWY, or check the Internet flow map to find problem areas before you start your trip.





## *Information At Your Fingertips*

The following phone numbers offer more information about how to get around Puget Sound.

### **WSDOT NUMBERS**

#### **TRAFFIC SYSTEMS MANAGEMENT CENTER:** (206) 440-4790

If you have technical questions about how WSDOT's highway system works or would like to arrange a tour of our Traffic Systems Management Center, this is the number to call. The recorded phone line will ask you to leave a message, to which our staff will promptly respond.

#### **TRAFFIC CONDITIONS AND CONSTRUCTION:** **DOT-HIWAY** (206) 368-4499, or 1-800-695-ROAD

This number, managed by WSDOT, is a 24-hour menu-driven telephone system that provides information on regional traffic conditions, construction on state, city and county roads, and other transportation-related items.

#### **I-5 HOV CONSTRUCTION:** (206) 440-KARS, or (206) 440-5277

During work hours, this number reaches office staff in the WSDOT Construction Traffic Coordination Office, and is especially useful for people who have questions about high-occupancy-vehicle lane construction on I-5. After hours, the phone line is forwarded to a recording.

#### **WSDOT FERRIES:** (206) 464-6400, or 1-800-84FERRY.

This recorded telephone number provides schedule and rate information on WSDOT's numerous ferry boats connecting cities and towns along the area's inland waterways.

## *Other Transportation Agencies*

#### **AMTRAK:** 1-800-USA-RAIL (1-800-872-7245)

This phone line reaches Amtrak's customer service representatives, can provide schedule and ticket information for Amtrak's passenger trains.

#### **SEA-TAC FLIGHTLINE:** (206) 431-4444

Callers can dial this recorded phone line to get answers to questions on a variety of airport topics, ranging from parking to lost and found services.

#### **PIERCE COUNTY TRANSIT:** (206) 581-8000, or 1-800-562-8109

Between 6 a.m. and 7 p.m. Monday through Friday, and from 9 a.m. to 5 p.m. each Saturday and Sunday, this menu-driven telephone line provides access to customer service representatives. After hours, the phone forwards to a message.

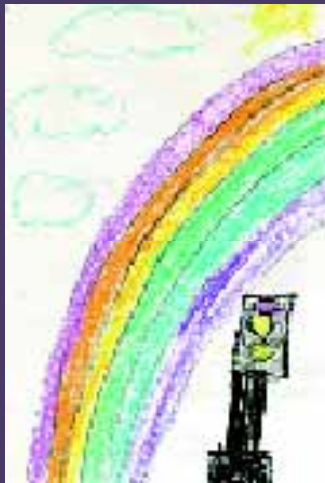
#### **SNOHOMISH COUNTY COMMUNITY TRANSIT:** (206) 353-RIDE, or 1-800-562-1375

Customer service representatives are available at this phone number to answer questions each Monday through Friday from 5:30 a.m. to 9 p.m., and on weekends and holidays from 8 a.m. to 4:30 p.m. After hours, the phone is forwarded to a message.

#### **KING COUNTY METRO TRANSIT:** (206) 553-3000

This telephone line provides menu options to explain Metro's services. It also provides 24-hour access to Metro's rider information specialists.

Persons with disabilities may request this information be prepared and supplied in alternate forms by calling collect (206) 664-9009 or 1-800-486-8392 (TTY or V).



This publication was written and designed by WSDOT Northwest Region staff. For more copies of this brochure, or to organize your own tour of TSMC, please call (206) 440-4790, or write to:

Traffic Systems Management Center  
Washington State Department of Transportation  
P.O. Box 330310, Mail Stop 25  
Seattle, WA 98133-9710.